

Should Ecological Regions or Land-Cover Composition Guide Establishment of Nutrient Criteria?

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The continuing expansion of anthropogenic influence across the continental United States has motivated the establishment of nutrient criteria for streams, lakes, and estuaries as a means to promote the protection of aquatic resources. Nutrient criteria have been established based on ecoregional differences, recognizing that geographic variation in climate, topography, geology, and land use require use of different criteria values for different regions of the continental United States. Several studies have demonstrated that land-cover composition also strongly influences nutrient concentrations and yields. We examined the relative roles of ecoregions and watershed land-cover composition in explaining variability in nitrogen (N) and phosphorus (P) concentrations by re-analyzing the National Eutrophication Survey (NES) data reported by Omernik (1977). The variance of N concentrations among land-cover composition classes within ecoregions was six times larger than the variance among ecoregions. For P concentrations, land-cover composition within ecoregions accounted for three times more variance than ecoregions themselves. Variance across ecoregions was only weakly significant after accounting for variance in land-cover composition within ecoregions. The results suggest that the relationship between land-cover composition and nutrient concentrations in aquatic systems should also be used to help guide establishment of nutrient criteria.